Postel

Network Working Group
Request for Comments: 1140
Obsoletes: RFCs 1130,
1100, 1083

Internet Activities Board
J. Postel, Editor
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IAB OFFICIAL PROTOCOL STANDARDS

Status of this Memo

This memo describes the state of standardization of protocols used in the Internet as determined by the Internet Activities Board (IAB). Distribution of this memo is unlimited.

Table of Contents

Introduction 2
1. The Standardization Process 2
2. The Request for Comments Documents 5
3. Other Reference Documents 6
3.1. Assigned Numbers 6
3.2. Annotated Internet Protocols 6
3.3. Gateway Requirements 6
3.4. Host Requirements 6
3.5. The MIL-STD Documents 7
4. Explanation of Terms 7
4.1. Definitions of Protocol State 8
4.1.1. Standard Protocol 8
4.1.2. Draft Standard Protocol 9
4.1.3. Proposed Standard Protocol 9
4.1.4. Experimental Protocol 9
4.1.5. Historic Protocol 9
4.2. Definitions of Protocol Status 9
4.2.1. Required Protocol 9
4.2.2. Recommended Protocol 10
4.2.3. Elective Protocol 10
4.2.4. Limited Use Protocol 10
4.2.5. Not Recommended Protocol 10
5. The Standards Track 10
5.1. The RFC Processing Decision Table 10
5.2. The Standards Track Diagram 12
6. The Protocols 14
6.1. Recent Changes 14
6.1.1. New RFCs 14
6.1.2. Other Changes 17
6.2. Standard Protocols 18

6.3. Network-Specific Standard Protocols 19
6.4. Draft Standard Protocol 20
6.5. Proposed Standard Protocol 21
6.6. Experimental Protocol 22
6.7. Historic Protocol 22
7. Contacts 23
7.1. IAB, IETF, and IRTF Contacts 23
7.1.1. Internet Activities Board (IAB) Contact 23
7.1.2. Internet Engineering Task Force (IETF) Contact 23
7.1.3. Internet Research Task Force (IETF) Contact 24
7.2. Internet Assigned Numbers Authority (IANA) Contact . . . 24
7.3. Request for Comments Editor Contact 25
7.4. Network Information Center Contact 25
7.5. Other Sources for Requests for Comments 26
7.5.1. NSF Network Service Center (NNSC) 26
7.5.2. NSF Network Information Service (NIS) 26
7.5.3. CSNET Coordination and Information Center (CIC) . . . 26
8. Security Considerations 27
9. Author's Address 27

Introduction

Discussion of the standardization process and the RFC document series is presented first, then the explanation of the terms is presented, the lists of protocols in each stage of standardization follows and finally come pointers to references and contacts for further information.

This memo is issued quarterly, please be sure the copy you are reading is dated within the last three months. Current copies may be obtained from the Network Information Center or from the Internet Assigned Numbers Authority (see the contact information at the end of this memo). Do not use this edition after 31-Aug-90.

See Section 6.1 for a description of recent changes.

1. The Standardization Process

The Internet Activities Board maintains this list of documents that define standards for the Internet protocol suite (see RFC-1120 for an explanation of the role and organization of the IAB and its subsidiary groups, the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF)). The IAB provides these standards with the goal of co-ordinating the evolution of the Internet protocols; this co-ordination has become quite important as the Internet protocols are increasingly in general commercial use.

The majority of Internet protocol development and standardization

activity takes place in the working groups of the Internet Engineering Task Force.

Protocols which are to become standards in the Internet go through a series of states (proposed standard, draft standard, and standard) involving increasing amounts of scrutiny and experimental testing. At each step, the Internet Engineering Steering Group (IESG) of the IETF must make a recommendation for advancement of the protocol and the IAB must ratify it. If a recommendation is not ratified, the protocol is remanded to the IETF for further work.

To allow time for the Internet community to consider and react to standardization proposals, the IAB imposes a minimum delay of 4 months before a proposed standard can be advanced to a draft standard and 6 months before a draft standard can be promoted to standard.

It is general IAB practice that no proposed standard can be promoted to draft standard without at least two independent implementations (and the recommendation of the IESG). Promotion from draft standard to standard generally requires operational experience and demonstrated interoperability of two or more implementations (and the recommendation of the IESG).

In cases where there is uncertainty as to the proper decision concerning a protocol the IAB may convene a special review committee consisting of experts from the IETF, IRTF and the IAB with the purpose of recommending an explicit action to the IAB.

Advancement of a protocol to proposed standard is an important step since it marks a protocol as a candidate for eventual standardization (it puts the protocol "on the standards track"). Advancement to draft standard is a major step which warns the community that, unless major objections are raised or flaws are discovered, the protocol is likely to be advanced to standard in six months.

Some protocols have been superseded by better ones or are otherwise unused. Such protocols are still documented in this memorandum with the designation "historic".

Because the IAB believes it is useful to document the results of early protocol research and development work, some of the RFCs document protocols which are still in an experimental condition. The protocols are designated "experimental" in this memorandum. They appear in this report as a convenience to the community and not as evidence of their standardization.

In addition to the working groups of the IETF, protocol development and experimentation may take place as a result of the work of the

research groups of the Internet Research Task Force, or the work of other individuals interested in Internet protocol development. The IAB encourages the documentation of such experimental work in the RFC series, but none of this work is considered to be on the track for standardization until the IESG has made a recommendation to advance the protocol to the proposed standard state, and the IAB has approved this step.

A few protocols have achieved widespread implementation without the approval of the IESG and the IAB. For example, some vendor protocols have become very important to the Internet community even though they have not been recommended by the IESG or ratified by the IAB. However, the IAB strongly recommends that the IAB standards process be used in the evolution of the protocol suite to maximize interoperability (and to prevent incompatible protocol requirements from arising). The IAB reserves the use of the terms "standard", "draft standard", and "proposed standard" in any RFC or other publication of Internet protocols to only those protocols which the IAB has approved.

In addition to a state (like "proposed standard") a protocol is also assigned a status, or requirement level. A protocol can be required, meaning that all systems in the Internet must implement it. For example, the Internet Protocol (IP) is required. A protocol may be recommended, meaning that systems should implement this protocol. A protocol may be elective, meaning that systems may implement this protocol; that is, if (and only if) the functionality of this protocol is needed or useful for a system it must use this protocol to provide the functionality. A protocol may be termed limited use or even not recommended if it is not intended to be generally implemented; for example, experimental or historic protocols.

When a protocol is on the standards track, that is in the proposed standard, draft standard, or standard state (see Section 5), the status is the current status. However, the IAB will also endeavor to indicate the eventual status this protocol will have when the standardization is completed.

The IAB realizes that a one word label is not sufficient to characterize the implementation requirements for a protocol in all situations. In many cases, an additional paragraph about the status will be provided, and in some cases reference will be made to separate requirements documents.

Few protocols are required to be implemented in all systems. This is because there is such a variety of possible systems; for example, gateways, terminal servers, workstations, multi-user hosts. It is not necessary for a gateway to implement TCP or the protocols that

use TCP (though it may be useful). It is expected that general purpose hosts will implement at least IP (including ICMP and IGMP), TCP and UDP, Telnet, FTP, NTP, SMTP, Mail, and the Domain Name System (DNS).

2. The Request for Comments Documents

The documents called Request for Comments (or RFCs) are the working notes of the "Network Working Group", that is the Internet research and development community. A document in this series may be on essentially any topic related to computer communication, and may be anything from a meeting report to the specification of a standard.

Notice:

> All standards are published as RFCs, but not all RFCs specify standards.

Anyone can submit a document for publication as an RFC. Submissions must be made via electronic mail to the RFC Editor (see the contact information at the end of this memo).

While RFCs are not refereed publications, they do receive technical review from the task forces, individual technical experts, or the RFC Editor, as appropriate.

The RFC series comprises a wide range of documents such as informational documents of general interests to specifications of standard Internet protocols. In cases where submission is intended to document a proposed standard, draft standard, or standard protocol, the RFC Editor will publish the document only with the approval of both the IESG and the IAB. For documents describing experimental work, the RFC Editor will typically request review comments from the relevant IETF working group or IRTF research group and provide those comments to the author prior to committing to publication. See Section 5.1 for more detail.

Once a document is assigned an RFC number and published, that RFC is never revised or re-issued with the same number. There is never a question of having the most recent version of a particular RFC. However, a protocol (such as File Transfer Protocol (FTP)) may be improved and re-documented many times in several different RFCs. It is important to verify that you have the most recent RFC on a particular protocol. This "IAB Official Protocol Standards" memo is the reference for determining the correct RFC to refer to for the current specification of each protocol.

The RFCs are available from the Network Information Center at SRI

International, and a number of other sites. For more information about obtaining RFCs, see Sections 7.4 and 7.5.

3. Other Reference Documents

There are four other reference documents of interest in checking the current status of protocol specifications and standardization. These are the Assigned Numbers, the Annotated Internet Protocols, the Gateway Requirements, and the Host Requirements. Note that these documents are revised and updated at different times; in case of differences between these documents, the most recent must prevail.

Also, one should be aware of the MIL-STD publications on IP, TCP, Telnet, FTP, and SMTP. These are described in Section 3.5.

3.1. Assigned Numbers

This document lists the assigned values of the parameters used in the various protocols. For example, IP protocol codes, TCP port numbers, Telnet Option Codes, ARP hardware types, and Terminal Type names. Assigned Numbers was most recently issued as RFC-1060.

Another document, Internet Numbers, lists the assigned IP network numbers, and the autonomous system numbers. Internet Numbers was most recently issued as RFC-1117.

3.2. Annotated Internet Protocols

This document lists the protocols and describes any known problems and ongoing experiments. This document was most recently issued as RFC-1011 under the title "Official Internet Protocols".

3.3. Gateway Requirements

This document reviews the specifications that apply to gateways and supplies guidance and clarification for any ambiguities. Gateway Requirements is RFC-1009. A working group of the IETF is actively preparing a revision.

3.4. Host Requirements

This pair of documents reviews the specifications that apply to hosts and supplies guidance and clarification for any ambiguities. Host Requirements was recently issued as RFC-1122 and RFC-1123.

3.5. The MIL-STD Documents

The Internet community specifications for IP (RFC-791) and TCP (RFC-793) and the DoD MIL-STD specifications are intended to describe exactly the same protocols. Any difference in the protocols specified by these sets of documents should be reported to DCA and to the IAB. The RFCs and the MIL-STDs for IP and TCP differ in style and level of detail. It is strongly advised that the two sets of documents be used together.

The IAB and the DoD MIL-STD specifications for the FTP, SMTP, and Telnet protocols are essentially the same documents (RFCs 765, 821, 854). The MIL-STD versions have been edited slightly. Note that the current Internet specification for FTP is RFC-959.

Internet Protocol (IP)	MIL-STD-1777
Transmission Control Protocol (TCP)	MIL-STD-1778
File Transfer Protocol (FTP)	MIL-STD-1780
Simple Mail Transfer Protocol (SMTP)	MIL-STD-1781
Telnet Protocol and Options (TELNET)	MIL-STD-1782

These documents are available from the Naval Publications and Forms Center. Requests can be initiated by telephone, telegraph, or mail; however, it is preferred that private industry use form DD1425, if possible. These five documents are included in the 1985 DDN Protocol Handbook (available from the Network Information Center, see Section 7.4).

Naval Publications and Forms Center, Code 3015
5801 Tabor Ave
Philadelphia, PA 19120
Phone: 1-215-697-3321 (order tape)
1-215-697-4834 (conversation)

4. Explanation of Terms

There are two independent categorization of protocols. The first is the STATE of standardization which is one of "standard", "draft standard", "proposed standard", "experimental", or "historic". The second is the STATUS of this protocol which is one of "required", "recommended", "elective", "limited use", or "not recommended".

The IAB notes that the status or requirement level is difficult to portray in a one word label. These status labels should be considered only as an indication, and a further description should be consulted.

When a protocol is advanced to proposed standard or draft standard,

it is labeled with a current status and when possible, the IAB also notes the status that that protocol is expected to have when it reaches the standard state.

At any given time a protocol is a cell of the following matrix. Protocols are likely to be in cells in about the following proportions (indicated by the relative number of Xs). A new protocol is most likely to start in the (proposed standard, elective) cell, or the (experimental, not recommended) cell.

STATUS	Req	Rec	Ele	Lim	Not
Std	X	XXX	XXX		
Draft	X	X	XXX		
Prop		X	XXX	X	
Expr			X	XXX	X
Hist				X	XXX

What is a "system"?

Some protocols are particular to hosts and some to gateways; a few protocols are used in both. The definitions of the terms below will refer to a "system" which is either a host or a gateway (or both). It should be clear from the context of the particular protocol which types of systems are intended.

4.1. Definitions of Protocol State

There are two independent categorizations of protocols. The first is the STATE of standardization, which is one of "standard", "draft standard", "proposed standard", "experimental", or "historic".

4.1.1. Standard Protocol

The IAB has established this as an official standard protocol for the Internet. These are separated into two groups: (1) IP protocol and above, protocols that apply to the whole Internet; and (2) network-specific protocols, generally specifications of how to do IP on particular types of networks.

4.1.2. Draft Standard Protocol

The IAB is actively considering this protocol as a possible Standard Protocol. Substantial and widespread testing and comment are desired. Comments and test results should be submitted to the IAB. There is a possibility that changes will be made in a Draft Standard Protocol before it becomes a Standard Protocol.

4.1.3. Proposed Standard Protocol

These are protocol proposals that may be considered by the IAB for standardization in the future. Implementation and testing by several groups is desirable. Revision of the protocol specification is likely.

4.1.4. Experimental Protocol

A system should not implement an experimental protocol unless it is participating in the experiment and has coordinated its use of the protocol with the developer of the protocol.

Typically, experimental protocols are those that are developed as part of an ongoing research project not related to an operational service offering. While they may be proposed as a service protocol at a later stage, and thus become proposed standard, draft standard, and then standard protocols, the designation of a protocol as experimental may sometimes be meant to suggest that the protocol, although perhaps mature, is not intended for operational use.

4.1.5. Historic Protocol

These are protocols that are unlikely to ever become standards in the Internet either because they have been superseded by later developments or due to lack of interest.

4.2. Definitions of Protocol Status

There are two independent categorizations of protocols. The second is the STATUS of this protocol which is one of "required", "recommended", "elective", "limited use", or "not recommended".

4.2.1. Required Protocol

A system must implement the required protocols.

4.2.2. Recommended Protocol

A system should implement the recommended protocols.

4.2.3. Elective Protocol

A system may or may not implement an elective protocol. The general notion is that if you are going to do something like this, you must do exactly this. There may be several elective protocols in a general area, for example, there are several electronic mail protocols, and several routing protocols.

4.2.4. Limited Use Protocol

These protocols are for use in limited circumstances. This may be because of their experimental state, specialized nature, limited functionality, or historic state.

4.2.5. Not Recommended Protocol

These protocols are not recommended for general use. This may be because of their limited functionality, specialized nature, or experimental or historic state.

5. The Standards Track

This section discusses in more detail the procedures used by the RFC Editor and the IAB in making decisions about the labeling and publishing of protocols as standards.

5.1. The RFC Processing Decision Table

Here is the current decision table for processing submissions by RFC Editor. The processing depends on who submitted it, and the status they want it to have.

++++++++++++	S O U R C E			
Desired Status	IAB	IESG	IRSG or RG	Other
Full or Draft Standard	Publish (1)	Vote (3)	Bogus (2)	Bogus (2)
Proposed Standard	Publish (1)	Vote (3)	Refer (4)	Refer (4)
Experimental Protocol	Publish (1)	Notify (5)	Notify (5)	Notify (5)
Information or Opinion Paper	Publish (1)	Discretion (6)	Discretion (6)	Discretion (6)

(1) Publish.

(2) Bogus. Inform the source of the rules. RFCs specifying Standard, or Draft Standard must come from the IAB, only.

(3) Vote by the IAB. If approved then do Publish (1), else do Refer (4).

(4) Refer to an Area Director for review by a WG. Expect to see the document again only after approval by the IESG and the IAB.

(5) Notify both the IESG and IRSG. If no protest in 1 week then do Discretion (6), else do undefined.

(6) RFC Editor's discretion. The RFC Editor decides if a review is needed and if so by whom. RFC Editor decides to publish or

not.

Of course, in all cases the RFC Editor can request or make minor changes for style, format, and presentation purposes.

The IESG has designated Greg Vaudreuil as its agent for forwarding documents with IESG approval and for registering protest in response to notifications (5) to the RFC Editor. Documents from Area Directors or Working Group Chairs may be considered in the same way as documents from "other".

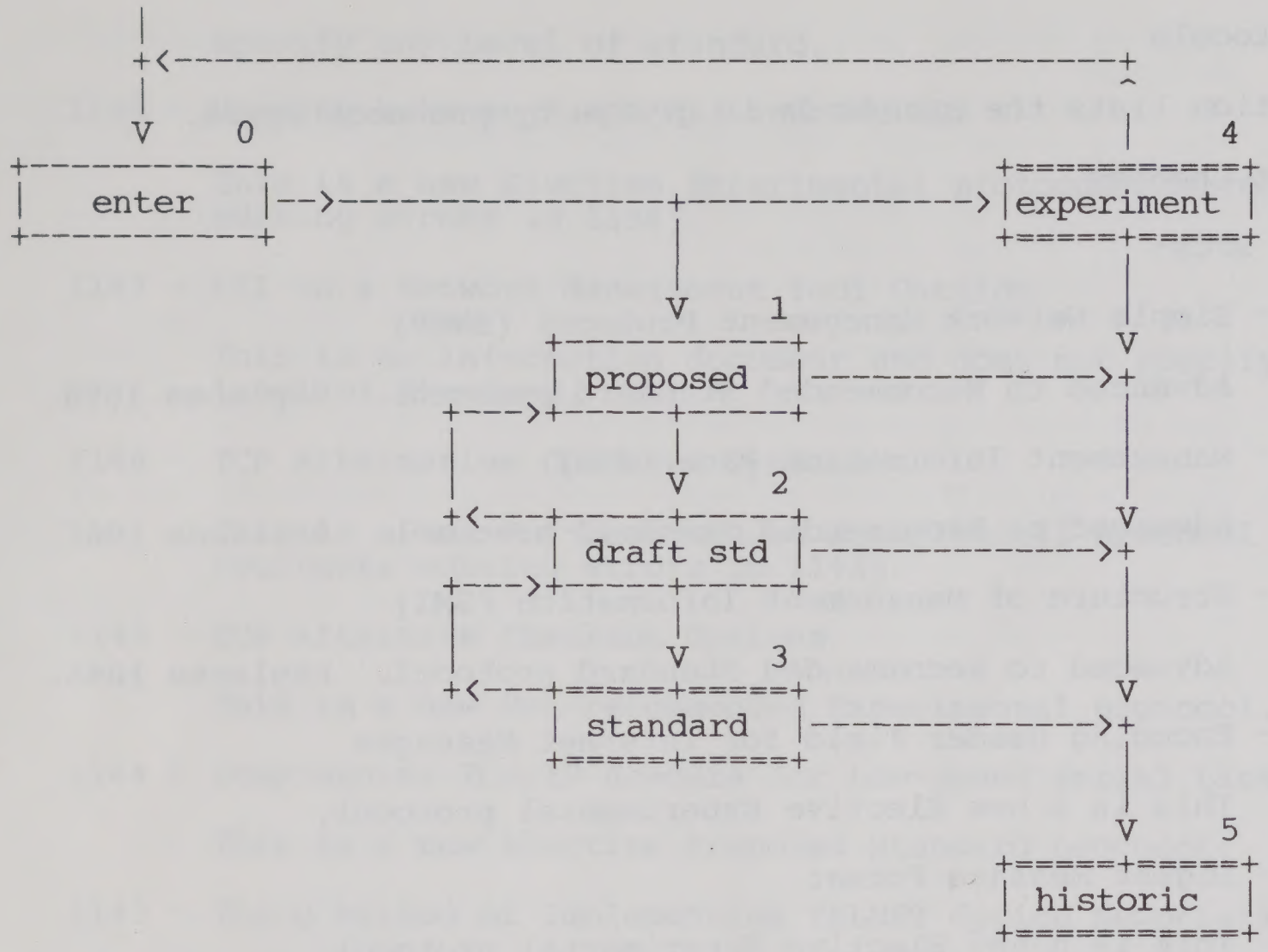
5.2. The Standards Track Diagram

There is a part of the STATUS and STATE categorization that is called the standards track. Actually, only the changes of state are significant to the progression along the standards track, though the status assignments may be changed as well.

The states illustrated by single line boxes are temporary states, those illustrated by double line boxes are long term states. A protocol will normally be expected to remain in a temporary state for several months (minimum four months for proposed standard, minimum six months for draft standard). A protocol may be in a long term state for many years.

A protocol may enter the standards track only on the recommendation of the IESG and by action of the IAB; and may move from one state to another along the track only on the recommendation of the IESG and by action of the IAB. That is, it takes both the IESG and the IAB to either start a protocol on the track or to move it along.

Generally, as the protocol enters the standards track a decision is made as to the eventual STATUS (elective, recommended, or required) the protocol will have, although a somewhat less stringent current status may be assigned, and it then is placed in the the proposed standard STATE with that status. So the initial placement of a protocol is into state 1. At any time the STATUS decision may be revisited.



The transition from proposed standard (1) to draft standard (2) can only be by action of the IAB on the recommendation of the IESG and only after the protocol has been proposed standard (1) for at least four months.

The transition from draft standard (2) to standard (3) can only be by action of the IAB on the recommendation of the IESG and only after the protocol has been draft standard (2) for at least six months.

Occasionally, the decision may be that the protocol is not ready for standardization and will be assigned to the experimental state (4). This is off the standards track, and the protocol may be resubmitted to enter the standards track after further work. There are other paths into the experimental and historic states that do not involve IAB action.

Sometimes one protocol is replaced by another and thus becomes historic, it may happen that a protocol on the standards track is in a sense overtaken by another protocol (or other events) and becomes historic (state 5).

6. The Protocols

This section lists the standards in groups by protocol state.

6.1. Recent Changes

6.1.1. New RFCs:

1157 - Simple Network Management Protocol (SNMP)

Advanced to Recommended Standard protocol. Replaces 1098.

1156 - Management Information Base (MIB)

Advanced to Recommended Standard protocol. Replaces 1066.

1155 - Structure of Management Information (SMI)

Advanced to Recommended Standard protocol. Replaces 1065.

1154 - Encoding Header Field for Internet Messages

This is a new Elective Experimental protocol.

1153 - Digest Message Format

This is a new Elective Experimental protocol.

1152 - Workshop Report: Internet Research Steering Group Workshop on Very-High-Speed Networks

This is an information document and does not specify any level of standard.

1151 - Version 2 of the Reliable Data Protocol (RDP)

This is an update to a Not-recommended Experimental protocol.

1150 - FYI on FYI

This is an information document and does not specify any level of standard.

1149 - A Standard for the Transmission of IP Datagrams on Avian Carriers

This describes an implementation technique, and does not

specify any level of standard.

1148 - Mapping between X.400(88) and RFC 822

This is a new Elective Experimental protocol (corrects editing errors in 1138).

1147 - FYI on a Network Management Tool Catalog

This is an information document and does not specify any level of standard.

1146 - TCP Alternative Checksum Options

This is a new Not-recommended Experimental protocol (corrects editing errors in 1145).

1145 - TCP Alternate Checksum Options

This is a new Not-recommended Experimental protocol.

1144 - Compressing TCP/IP Headers for Low-Speed Serial Links

This is a new Elective Proposed Standard protocol.

1143 - The Q Method of Implementing TELNET Option Negotiation

This describes an implementation technique.

1142 - < not issued yet >

1141 - Incremental Updating of the Internet Checksum

This describes an implementation technique.

1140 - IAB Official Protocol Standards

This memo.

1139 - An Echo Function for ISO 8473

This is a new Elective Proposed Standard protocol.

1138 - Mapping between X.400(88) and RFC 822

This is a new Elective Experimental protocol (replaced by 1148).

1137 - Mapping Between Full RFC 822 and RFC 822 with Restricted Encoding

This is a new Elective Experimental protocol.

1136 - Administrative Domains and Routing Domains: A Model for Routing in the Internet

This is a discussion document and does not specify any level of standard.

1135 - The Helminthiasis of the Internet

This is a discussion document and does not specify any level of standard.

1134 - The Point-to-Point Protocol: A Proposal for Multi-Protocol Transmission of Datagrams Over Point-to-Point Links

This is a new Elective Proposed Standard protocol.

1133 - Routing between the NSFNET and the DDN

This is a discussion document and does not specify any level of standard.

1132 - A Standard for the Transmission of 802.2 Packets over IPX Networks

This is a new Elective Network-Specific Standard protocol, that is, a full Standard for a network-specific situation.

1131 - The OSPF Specification

This is a new Elective Proposed Standard protocol.

1060 - Assigned Numbers

The status report on assigned numbers and protocol parameters.

6.1.2. Other Changes:

The following are changes to protocols listed in the previous edition.

1058 - Routing Information Protocol (RIP)

Advanced to Elective Draft Standard protocol.

1045 - Versatile Message Transaction Protocol (VMTP)

Moved to Elective Experimental protocol.

1006 - ISO Transport Service on top of the TCP (TP-TCP)

Advanced to Elective Draft Standard protocol.

996 - Statistics Server (STATSRV)

Moved to Not Recommended Historic protocol.

954 - WhoIs Protocol (NICNAME)

Advanced to Elective Draft Standard protocol.

937 - Post Office Protocol, Version 2 (POP2)

Moved to Not Recommended Historic protocol.

916 - Reliable Asynchronous Transfer Protocol (RATP)

Moved to Not Recommended Historic protocol.

914 - Thinwire Protocol (THINWIRE)

Moved to Not Recommended Historic protocol.

818 - Remote Telnet Service (RTELNET)

Moved to Not Recommended Historic protocol.

569 - Network Standard Text Editor (NETED)

Moved to Not Recommended Historic protocol.

407 - Remote Job Entry (RJE)

Moved to Not Recommended Historic protocol.

6.2. Standard Protocols

Protocol	Name	Status	RFC
--------	Assigned Numbers	Required	1060
--------	Gateway Requirements	Required	1009
--------	Host Requirements - Communications	Required	1122
--------	Host Requirements - Applications	Required	1123
IP	Internet Protocol	Required	791
	as amended by:		
--------	IP Subnet Extension	Required	950
--------	IP Broadcast Datagrams	Required	919
--------	IP Broadcast Datagrams with Subnets	Required	922
ICMP	Internet Control Message Protocol	Required	792
IGMP	Internet Group Multicast Protocol	Recommended	1112
UDP	User Datagram Protocol	Recommended	768
TCP	Transmission Control Protocol	Recommended	793
SMI	Structure of Management Information	Recommended	1155
MIB	Management Information Base	Recommended	1156
SNMP	Simple Network Management Protocol	Recommended	1157
DOMAIN	Domain Name System	Recommended	1034,1035
TELNET	Telnet Protocol	Recommended	854
FTP	File Transfer Protocol	Recommended	959
SMTP	Simple Mail Transfer Protocol	Recommended	821
MAIL	Format of Electronic Mail Messages	Recommended	822
CONTENT	Content Type Header Field	Recommended	1049
EGP	Exterior Gateway Protocol	Recommended	904
ECHO	Echo Protocol	Recommended	862
NTP	Network Time Protocol	Recommended	1119
NETBIOS	NetBIOS Service Protocols	Elective	1001,1002
DISCARD	Discard Protocol	Elective	863
CHARGEN	Character Generator Protocol	Elective	864
QUOTE	Quote of the Day Protocol	Elective	865
USERS	Active Users Protocol	Elective	866
DAYTIME	Daytime Protocol	Elective	867
TIME	Time Server Protocol	Elective	868

Notes:

IGMP -- The Internet Activities Board intends to move towards general adoption of IP multicasting, as a more efficient solution than broadcasting for many applications. The host interface has been standardized in RFC-1112; however, multicast-routing gateways are in the experimental stage and are not widely available. An Internet host should support all of RFC-1112, except for the IGMP protocol itself which is optional; see RFC-1122 for more details. Even without IGMP, implementation of RFC-1112 will provide an important advance: IP-layer access to local network multicast addressing. It

is expected that IGMP will become recommended for all hosts and gateways at some future date.

SMI, MIB, SNMP -- The Internet Activities Board recommends that all IP and TCP implementations be network manageable. This implies implementation of the Internet MIB (RFC-1156) and at least one of the two recommended management protocols SNMP (RFC-1157) or CMOT (RFC-1095). It should be noted that, at this time, SNMP is a full Internet standard and CMOT is a draft standard. See also the Host and Gateway Requirements RFCs for more specific information on the applicability of this standard.

6.3. Network-Specific Standard Protocols

Protocol	Name	Status	RFC
ARP	Address Resolution Protocol	Elective	826
RARP	A Reverse Address Resolution Protocol	Elective	903
IP-ARPA	Internet Protocol on ARPANET	Elective BBN	1822
IP-WB	Internet Protocol on Wideband Network	Elective	907
IP-X25	Internet Protocol on X.25 Networks	Elective	877
IP-E	Internet Protocol on Ethernet Networks	Elective	894
IP-EE	Internet Protocol on Exp. Ethernet Nets	Elective	895
IP-IEEE	Internet Protocol on IEEE 802	Elective	1042
IP-DC	Internet Protocol on DC Networks	Elective	891
IP-HC	Internet Protocol on Hyperchannel	Elective	1044
IP-ARC	Internet Protocol on ARCNET	Elective	1051
IP-SLIP	Transmission of IP over Serial Lines	Elective	1055
IP-NETBIOS	Transmission of IP over NETBIOS	Elective	1088
IP-FDDI	Transmission of IP over FDDI	Elective	1103
IP-IPX	Transmission of 802.2 over IPX Networks	Elective	1132

Notes:

It is expected that a system will support one or more physical networks and for each physical network supported the appropriate protocols from the above list must be supported. That is, it is elective to support any particular type of physical network, and for the physical networks actually supported it is required that they be supported exactly according to the protocols in the above list. See also the Host and Gateway Requirements RFCs for more specific information on network-specific ("link layer") protocols.

6.4. Draft Standard Protocols

Protocol	Name	Status	RFC
--------	Mail Privacy: Procedures	Elective	1113
--------	Mail Privacy: Key Management	Elective	1114
--------	Mail Privacy: Algorithms	Elective	1115
CMOT	Common Management Information Services and Protocol over TCP/IP	Recommended	1095
BOOTP	Bootstrap Protocol	Recommended	951,1048,1084
RIP	Routing Information Protocol	Elective	1058
TP-TCP	ISO Transport Service on top of the TCP	Elective	1006
NICNAME	WhoIs Protocol	Elective	954
TFTP	Trivial File Transfer Protocol	Elective	783

Notes:

CMOT -- The Internet Activities Board recommends that all IP and TCP implementations be network manageable. This implies implementation of the Internet MIB (RFC-1156) and at least one of the two recommended management protocols SNMP (RFC-1157) or CMOT (RFC-1095). It should be noted that, at this time, SNMP is a full Internet standard and CMOT is a draft standard. See also the Host and Router Requirements RFCs for more specific information on the applicability of this standard.

RIP -- The Routing Information Protocol (RIP) is widely implemented and used in the Internet. However, both implementors and users should be aware that RIP has some serious technical limitations as a routing protocol. The IETF is currently developing several candidates for a new standard "open" routing protocol with better properties than RIP. The IAB urges the Internet community to track these developments, and to implement the new protocol when it is standardized; improved Internet service will result for many users.

TP-TCP -- As OSI protocols become more widely implemented and used, there will be an increasing need to support interoperation with the TCP/IP protocols. The Internet Engineering Task Force is formulating strategies for interoperation. RFC-1006 provides one interoperation mode, in which TCP/IP is used to emulate TP0 in order to support OSI applications. Hosts that wish to run OSI connection-oriented applications in this mode should use the procedure described in RFC-1006. In the future, the IAB expects that a major portion of the Internet will support both TCP/IP and OSI (inter-)network protocols in parallel, and it will then be possible to run OSI applications across the Internet using full OSI protocol "stacks".

6.5. Proposed Standard Protocols

Protocol	Name	Status	RFC
MIB-II	MIB-II	Elective	xxxx
IP-CMPRS	Compressing TCP/IP Headers	Elective	1144
---	Echo for ISO-8473	Elective	1139
PPP	Point to Point Protocol	Elective	1134
OSPF	Open Shortest Path First Routing	Elective	1131
SUN-NFS	Network File System Protocol	Elective	1094
POP3	Post Office Protocol, Version 3	Elective	1081,1082
SUN-RPC	Remote Procedure Call Protocol	Elective	1057
PCMAIL	Pcmail Transport Protocol	Elective	1056
NFILE	A File Access Protocol	Elective	1037
---	Mapping between X.400(84) and RFC-822	Elective	987,1026
NNTP	Network News Transfer Protocol	Elective	977
HOSTNAME	HOSTNAME Protocol	Elective	953
SFTP	Simple File Transfer Protocol	Elective	913
RLP	Resource Location Protocol	Elective	887
FINGER	Finger Protocol	Elective	742
SUPDUP	SUPDUP Protocol	Elective	734

Notes:

This section is being reviewed by the IESG, which will recommend that some of these protocols be moved to either the draft standard, or the experimental or historic categories.

MIB-II -- This memo defines a mandatory extension to the base MIB (RFC-1156) and is a Proposed Standard for the Internet community. The extensions described here are currently Elective, but when they become a standard, they will have the same status as RFC-1156, that is, Recommended. The Internet Activities Board recommends that all IP and TCP implementations be network manageable. This implies implementation of the Internet MIB (RFC-1156 and the extensions in RFC-xxxx) and at least one of the two recommended management protocols SNMP (RFC-1157) or CMOT (RFC-1095).

PPP -- Point to Point Protocol is a method of sending IP over serial lines, which are a type of physical network. It is expected that a system will support one or more physical networks and for each physical network supported the appropriate protocols from the network-specific standard protocols (Section 6.3) must be supported. That is, it is elective to support any particular type of physical network, and for the physical networks actually supported it is required that they be supported exactly according to the protocols listed. It is anticipated that PPP will be advanced to the network-specific standard protocol state in the future.

6.6. Experimental Protocols

Protocol	Name	Status	RFC
EHF-MAIL	Encoding Header Field for Mail	Elective	1154
DMF-MAIL	Digest Message Format for Mail	Elective	1153
RDP	Reliable Data Protocol	Limited Use	908,1151
--------	Mapping between X.400(88) and RFC-822	Elective	1148
TCP-ACO	TCP Alternate Checksum Option	Not Recommended	1146
--------	Mapping full 822 to Restricted 822	Elective	1137
BGP	Border Gateway Protocol	Limited Use	1105
IP-DVMRP	IP Distance Vector Multicast Routing	Not Recommended	1075
TCP-LDP	TCP Extensions for Long Delay Paths	Limited Use	1072
IMAP2	Interactive Mail Access Protocol	Limited Use	1064
IP-MTU	IP MTU Discovery Options	Not Recommended	1063
VMTP	Versatile Message Transaction Protocol	Elective	1045
COOKIE-JAR	Authentication Scheme	Not Recommended	1004
NETBLT	Bulk Data Transfer Protocol	Not Recommended	998
IRTP	Internet Reliable Transaction Protocol	Not Recommended	938
AUTH	Authentication Service	Not Recommended	931
LDP	Loader Debugger Protocol	Not Recommended	909
ST	Stream Protocol	Limited Use	IEN-119
NVP-II	Network Voice Protocol	Limited Use	ISI-memo
PVP	Packet Video Protocol	Limited Use	ISI-memo

6.7. Historic Protocols

Protocol	Name	Status	RFC
SGMP	Simple Gateway Monitoring Protocol	Not Recommended	1028
HEMS	High Level Entity Management Protocol	Not Recommended	1021
STATSRV	Statistics Server	Not Recommended	996
POP2	Post Office Protocol, Version 2	Not Recommended	937
RATP	Reliable Asynchronous Transfer Protocol	Not Recommended	916
THINWIRE	Thinwire Protocol	Not Recommended	914
HMP	Host Monitoring Protocol	Not Recommended	869
GGP	Gateway Gateway Protocol	Not Recommended	823
RTELNET	Remote Telnet Service	Not Recommended	818
CLOCK	DCNET Time Server Protocol	Not Recommended	778
MPM	Internet Message Protocol	Not Recommended	759
NETRJS	Remote Job Service	Not Recommended	740
NETED	Network Standard Text Editor	Not Recommended	569
RJE	Remote Job Entry	Not Recommended	407
XNET	Cross Net Debugger	Not Recommended	IEN-158
NAMESERVER	Host Name Server Protocol	Not Recommended	IEN-116
MUX	Multiplexing Protocol	Not Recommended	IEN-90
GRAPHICS	Graphics Protocol	Not Recommended	NIC-24308

7. Contacts

7.1. IAB, IETF, and IRTF Contacts

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Please send your comments about this list of protocols and especially about the Draft Standard Protocols to the Internet Activities Board care of Bob Braden, IAB Executive Director.

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The protocol standards are managed for the IAB by the Internet Assigned Numbers Authority.

Please refer to the documents "Assigned Numbers" (RFC-1060) and "Official Internet Protocols" (RFC-1011) for further information about the status of protocol documents. There are two documents that summarize the requirements for host and gateways in the Internet, "Host Requirements" (RFC-1122 and RFC-1123) and "Gateway Requirements" (RFC-1009).

How to obtain the most recent edition of this "IAB Official Protocol Standards" memo:

The file "in-notes/iab-standards.txt" may be copied via FTP from the VENERA.ISI.EDU computer using the FTP username "anonymous" and FTP password "guest".

7.3. Request for Comments Editor Contact

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Documents may be submitted via electronic mail to the RFC Editor for consideration for publication as RFC. If you are not familiar with the format or style requirements please request the "Instructions for RFC Authors". In general, the style of any recent RFC may be used as a guide.

7.4. The Network Information Center and Requests for Comments Distribution Contact

Contact:

DDN Network Information Center
SRI International
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333 Ravenswood Avenue
Menlo Park, CA 94025

1-800-235-3155
1-415-859-3695

NIC@NIC.DDN.MIL

The Network Information Center (NIC) provides many information services for the Internet community. Among them is maintaining the Requests for Comments (RFC) library.

RFCs can be obtained via FTP from NIC.DDN.MIL, with the pathname RFC:RFCnnnn.TXT where "nnnn" refers to the number of the RFC. A list of all RFCs may be obtained by copying the file RFC:RFC-INDEX.TXT. Log in with FTP username ANONYMOUS and password GUEST.

The NIC also provides an automatic mail service for those sites which cannot use FTP. Address the request to SERVICE@NIC.DDN.MIL and in the subject field of the message indicate the file name, as in

"Subject: SEND RFC:RFCnnnn.TXT".

Some RFCs are now available in PostScript, these may be obtained from the NIC in a similar fashion by substituting ".PS" for ".TXT".

How to obtain the most recent edition of this "IAB Official Protocol Standards" memo:

The file RFC:IAB-STANDARDS.TXT may be copied via FTP from the NIC.DDN.MIL computer following the same procedures used to obtain RFCs.

7.5. Other Sources for Requests for Comments

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8. Security Considerations

Security issues are not addressed in this memo.

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